Project 25 Document Suite
Reference

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Publication Notice

Abstract

This document tracks the current state of Project 25 standards documents. The Telecommunications Industry Association (TIA) TR8 Committee meets about every two months to develop, revise, and approve Project 25 standards documents. This document is updated soon after each TR8 Committee meeting to reflect Project 25 standards document progress.

Change Log

Version	Date	Changes
0.01 Draft	October 11, 2005	Initial Document
0.02 Draft	February 13, 2006	Revised the document's heading hierarchy.
0.03 Draft	March 22, 2006	Expanded document lists and decision tree graphics.
0.04 Draft	May 5, 2006	Updated document lists and modified decision tree graphics. Removed the Project 25 Standards Classification Index tables as it was decided they added little value.
0.05 Draft	June 23, 2006	Updated document lists and modified decision tree graphics.

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1 Project 25 Document Suite

Project 25 (P25) is a partnership between the public safety communications community and industry manufacturers whose goal is the publication of a suite of standards that enable the offering, procurement, and operation of interoperable digital two-way wireless communications products and systems that meet mission-critical needs of public safety practitioners. The formal standards development process is conducted by the Mobile and Personal Private Radio Standards Committee (TIA TR-8) of the Telecommunications Industry Association's (TIA) Standards and Technology Department. TIA is accredited by the American National Standards Institute (ANSI) to develop voluntary industry standards for a wide variety of telecommunications products. Project 25 is unique in that it is a user-driven process to develop a family of public safety communications standards for which the requirements have been defined by state, local and federal government users.

Project 25 is directed by a Steering Committee composed of user representatives from federal agencies, state governments, and local governments. All activities of the Project 25 Process must be approved by the Steering Committee and the TIA in accordance with the Memorandum of Understanding (MoU) consummated in 1993. Members of the public safety community attend regular meetings of the APCO Project 25 Interface Committee (APIC), which was established under the MoU to facilitate the TIA's development standards that can be adopted as part of the Project 25 standards suite.

Project 25 represents the public safety community's overall strategy to develop a digital modulation solution and achieve Federal Communications Commission (FCC) spectrum efficiency mandates calling for eventual migration to narrowband channel spacing in the VHF and UHF bands, which call for an eventual four-to-one reduction in spacing from 25 kHz to 6.25 kHz per voice channel. Project 25 addresses the FCC's mandate with a two-phase plan. Phase 1 defines the necessary technologies to provide for channel reduction from 25 kHz to 12.5 kHz, and Phase 2 defines an additional 50% reduction in channel size to 6.25 kHz. Note that the two spectrum regulatory bodies, the FCC and the National Telecommunications and Information Administration (NTIA), have stated that solutions which provide an equivalent 6.25 kHz voice channel size also would be acceptable.

The Project 25 Standards are driven by a public safety user-defined *Statement of Requirements* and an over-all approach to the development of the standards via a *Project 25 System Description and Organization* document. The organization of the standards divides the suite into documents relating to the Project 25 System Interfaces, to the Project 25 Services, and to the Project 25 Equipment. Associated with each interface, service, and equipment section is a set of documents that does either of the following:

- Describe and specify the standards appropriate to the section
- Describe tests to demonstrate compliance of the offered interface, service, and equipment to the standards.

1.1 Description and Specification Documents

Two types of documents are used to describe and specify the interface, service, or equipment: one type provides an Overview and the other type defines the Protocols. The purpose of the Overview document is to describe the operation and functions associated with the section but not to prescribe a standard. Thus the Overview document is considered *informative* and is only to provide background relating to the *Statement of Requirements*, show its relationship to the overall Project 25 System Model, and provide guidance to users, system designers, and manufacturers. The Protocol documents, on the other hand, are considered *normative* and will provide the required messages, formats, and specifications necessary for the Project 25 interfaces, services, and equipment to be interoperable and meet the users' *Statement of Requirements*.

1.2 Compliance Assessment Documents

To demonstrate compliance with the Protocol specifications, a set of test documents is defined. The first of the set provides a means to test for Conformance to the Protocol specifications. This document would typically be used by the manufacturer to test the system component or service for assurance of conformance to the associated Protocol documents. Next, a pair of test documents defines Performance Measurements and Methods of for a system component or service as well as Recommended Performance for the related performance measurements. These tests quantify service setup times, throughput delay times, bandwidths, co- and adjacent channel factors, etc. to ensure that the radio systems conform to radio and network regulations, that the radio systems behave as good neighbors to the systems of nearby agencies, and that the systems satisfy other performance requirements of the users. Finally, there are sets of Interoperability Test Process and Procedures to be performed on operational equipment to assure the users that equipment supplied by different manufacturers can indeed be trusted to interoperate under the conditions defined by the standards.

1.3 Standards Completion

For most cases, a Project 25 interface, service, or equipment Standard is not complete until all documents that provide the Overview, the Protocol Specifications, the Protocol Conformance Test Procedures, the Performance Measurements and Methods, the Performance Recommendations, and the Interoperability Test Process and Procedures are complete. In truth, the “Standards” are never complete and this becomes a living process. This is a practical result since there will be design improvements in the protocols and thus the protocol specifications will need to be changed (sometimes after products are developed or implemented). Or new technologies are developed or new regulations are enacted and the users will modify their requirements, which in turn results in new specification and testing standards. Thus the Standards do not remain fixed but will evolve with time and circumstances.

1.4 Document Status

Tables in the next sections list the most current documents related to the Project 25 (or P25) suite of standards. Tables list each document’s title, document number, publication date, and a brief description of the document’s purpose by listing portions of the document’s table of contents. Section 2 lists the documents that describe the P25 user requirements and the P25 standards structure. Sections 3 through 5 list the documents related to the P25 interfaces, services, and equipment. The documents are listed under two major divisions:

- Description and Specification Documents
- Compliance Assessment Documents

Note that the documents are freely available to Federal, state, and local public safety agencies. All others may purchase the documents from http://global.ihs.com/ by searching for TIA and Project 25 documents.

1.5 Legend for P25 Standards

The P25 standards suite refers to a set of standards documents that all have the identifier:

****NNN.XXXX

Where *** can be:

ANSI/TIA/EIA — a full standard

TIA — A TIA-only standard (the current objective is to move TIA Standards to full ANSI Standards)

TSB — A TIA Telecommunications Systems Bulletin that is not a standard but is useful to P25-compliant equipment manufacturers and users

Where NNN can be:

102 — P25 Phase I and some Phase II standards

905 — P25 Phase II

902 — P25 wide band services in the 700 MHz band

603 — Analog FM equipment

Where XXX can be:

Axxx — Services offered by P25

Bxxx — Systems defined by P25

Cxxx — Equipment performance measurement methods for P25

2 Project 25 User Requirements and Standards Structure

2.1 Project 25 Statement of Requirements

The public safety communication system users are responsible for providing and maintaining their user needs in the form of a system requirements document. The Steering Committee, with the involvement of its P25 User Needs Subcommittee (P25 UNS), establishes the priorities and scope for technical development by TIA of new and revised P25 standards. The P25 UNS' ongoing development of the Project 25 Statement of Requirements (P25 SOR), as approved by the Steering Committee, plays an essential role in not only developing standards that meet users' needs but also to establish the basis upon which equipment and systems can be assessed as being compliant with the P25 standards. The P25 SOR also establishes a feasible migration path for P25 equipment and systems to take advantage of emerging technologies. As a result, the P25 SOR establishes a balance between user needs and what industry is able to implement based on current physical, technological, and regulatory constraints. Table 1 lists current P25 SOR documents.

Table 1: Project 25 Statement of Requirements Documents

Documents
■ *P25 Statement of Requirements (SOR)*, (Mar 2006) (Project 25 Overview, Detailed Standards Suite Proposed [Common Air Interface, Data Interface, Inter-RF Subsystem Interface, Network Management Interface, Open Console Interface, and Open Fixed/Base Station Interface], P25 System Overview, Encryption, Subscriber Equipment, Interoperability, Migration)

2.2 Project 25 System Description and Organization

A P25 system overview document is used to describe how the users and manufacturers envision the P25 system, the logical interfaces and services which the standards will specify, and the documents needed to completely characterize the P25 Standards Suite. Project 25 provides this information in "shell" documents that are to give an overview of the entire suite of standards for all interfaces and gives a functional description for the current set of Common Air Interface features. (It should be noted that the P25 Suite of Documents will also contain overviews of individual interfaces and services, as well.) The current documents are listed in Table 2.

Table 2: Project 25 System Description and Organization Documents

Documents
■ *P25 System Description and Organization*, TIA-102A (Nov 1995) (Project 25 Overview, General System Model, Standards Organization, and Technical Requirements)

3 Suite of Standards for Project 25 Interfaces and Systems

This section discusses the suite of standards documents for the (currently) eight interfaces of a P25 system. For each of the interfaces, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

One or more TIA-published documents are identified with each category of Overview, Protocol, Conformance Test Procedures, Performance Measurement Methods, Performance Recommendations, and Interoperability Test Procedures. For some categories, a document is not necessary or appropriate and those will be identified with a "No documents planned."

Note! When the document box is empty for a category, please be aware that there are no published TIA standards at this time and be cautious of purchasing products without the benefit of published P25 standards.

3.1 Common Air Interface

The P25 Common Air Interface (CAI) uses frequency division multiple access (FDMA) methods with two modulations.The first defines the digital modulation used in the 12.5 kHz voice channel bandwidth and is mandatory for all Project 25 Phase I systems. The second defines the analog FM modulation used in 25 kHz and 12.5 kHz bandwidths and is mandatory in all Project 25 Phase I subscriber equipment (portable and mobile transceivers). Operation in a conventional mode is mandatory for P25 and operation using trunking is optional. The P25 structure defines trunking as a service. Section 4.2 lists trunking related documents.

3.1.1 FDMA Conventional Digital

The following table lists current FDMA conventional digital description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory P25 FDMA conventional digital standard.

Table 3: FDMA Conventional Digital Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 FDMA Common Air Interface Operational Description for Conventional Channels*, 102.BAAD (Dec 2003) (Unit Addressing, Repeater Addressing, Voice Transmit and Receive Operation, Packet Data Transmit and Receive Operation)
Protocol (Normative):	■ *Project 25 FDMA Common Air Interface*, 102.BAAA-A (Sep 2003) (Voice Coder, Voice Formats, Data Packets, Data Error Correction, Channel Access, Modulation, Transmit Bit Order)

Table 3: FDMA Conventional Digital Documents (Continued)

Document Type	Documents
	■ *Project 25 Link Control Word Formats and Messages*, 102.AABF-A (Dec 2004) (Part of voice message, Conventional and Trunked: Link Control Messages, Field Definitions, and Word Usages) ■ *Project 25 Conventional Control Messages*, AABG (Jul 1996) (Trunked system messages that may be applied to conventional systems: Emergency Alarm, Call Alert, Radio Check, Inhibit, and Uninhibit, Status Update and Request, Message, Telephone Interconnect Dialing, Radio Unit Monitor) ■ *Project 25 Conventional Control Messages*, Addendum 1 – Indvidual Telephone Calls, 102.AABG-1 (May 2006) (Control Messages Specifications, Annex A Message Sequence (informative))
Conformance Tests Procedures:	**Compliance Assessment Documents** ■ *Project 25 Common Air Interface Conformance Test*, 102.BAAB-B (Mar 2005) (Transmit Voice Format Tests, Transmit Data Format Tests, Receiver Tests)
Performance Measurement Methods:	■ *Digital C4FM/CQPSK Transceiver Measurement Methods*, 102.CAAA-C (see Section 5.2)
Performance Recommendations:	■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, 102.CAAB-C (see Section 5.2)
Interoperability Test Procedures:	■ *Project 25 Interoperability Test Procedures Conventional Voice Equipment*, 102.CABA (Feb 2002) (Subscriber Tests, Repeater Tests, Vocoder and Late Entry Tests, Analog Compatibility Tests, Encrypted Voice Tests)

3.1.2 FDMA Conventional Analog

FDMA conventional analog capabilities are mandatory for P25 Phase I subscriber equipment to provide backward compatibility with non-P25 systems. Section 5.1 lists the documents associated with this P25 Equipment feature.

3.1.3 FDMA Trunked Digital

FDMA trunked digital capabilities are a standard option for P25 systems. Section 4.2 lists the documents associated with this P25 Services feature.

3.1.4 TDMA Trunked Digital

Time division multiple access (TDMA) trunked digital capabilities are a standard option for P25 systems. Section 4.2 lists the documents associated with this P25 Services feature.

3.1.5 Vocoder

For P25 system voice services, the vocoder is mandatory. The following table lists current vocoder description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory P25 vocoder standard.

Table 4: Vocoder Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	■ *Project 25 Vocoder Description*, 102.BABA (Dec 2003) (Multi-Band Excitation Speech Model, Speech Input/Output Requirements, Speech Analysis, Parameter Encoding and Decoding, Bit Manipulations, Spectral Amplitude Enhancement, Adaptive Smoothing, Parameter Encoding Example, Speech Synthesis)
	Compliance Assessment Documents
Conformance Tests Procedures:	■ *Project 25 Vocoder Mean Opinion Score Conformance Test*, 102.BABB (May 1999) (Speech Data Bases, Production of Digital Vocoder Recorded Tapes, Subjective Evaluation of Speech Quality, MOS Result Analysis) ■ *Project 25 Vocoder Reference Test*, 102.BABC (Apr 1999) (A25VCTS Operation Manual, Test Computer Hardware and I/O Circuitry, Test Computer Software, Objective Performance Requirements)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

3.1.6 General CAI Documents

The following table lists current P25 CAI documents that are general to P25 systems.

Table 5: General Common Air Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	■ *Project 25 Common Air Interface Reserved Values*, BAAC-A (Dec 2003) (Special reserved values for particular fields of information, such as Network Access Code, Link Control Format, Key ID, Algorithm ID, etc.)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

3.2 Inter-RF Subsystem Interface

The following table lists current P25 Inter-RF Subsystem Interface (ISSI) description, specification, and assessment documents.

Table 6: Inter-RF Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Inter-RF Subsystem Interface Overview*, 102.BACC-A (Dec 2003) (ISSI Requirements and Standards Considerations)
Protocol (Normative):	■ *Project 25 Inter-RF Subsystem Interface Messages and Procedures for Voice Services*, 102.BACA-A (Accepted for Ballot process Jan 2006) (Architecture and Protocol Suite Overview, SIP Messages and Parameters Definition, RTP Message Vocabulary, Mobility Management, Call Control, and Push-to-Talk Management)

Table 6: Inter-RF Subsystem Interface Documents (Continued)

Document Type	Documents
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	

3.3 Fixed Station Subsystem Interface

The following table lists current P25 Fixed Station Subsystem Interface (FSSI) description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory (if using an RF Subsystem) P25 FSSI standard.

Table 7: Fixed Station Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	
Protocol (Normative):	■ *Project 25 Fixed Station Interface, Messages and Procedures*, 102.BAHA (Jun 2006) (defines a Conventional Fixed Station Interface (CFSI) between a conventional fixed station of a Fixed Station Subsystem and a Conventional Fixed Station Host (CFSH), voice services only) (CFSI Architecture, CFSI Analog Interface, and CFSI Digital Interface)
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	

3.4 Console Subsystem Interface

The following table lists current P25 Console Subsystem Interface (CSSI) description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory (if using an RF Subsystem) P25 CSSI standard.

Table 8: Console Subsystem Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	
Protocol (Normative):	
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	

3.5 Data Interface

The following table lists current P25 Subscriber Data Peripheral Interface and P25 Data Network Interface description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting data interface features) P25 Subscriber Data Peripheral Interface standard and P25 Data Network Interface standard.

Table 9: Subscriber Data Peripheral Interface and Data Network Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Data Overview*, BAEA-A (Jun 2004) (Overview, Categories, Data Services, and Data Configurations)
Protocol (Normative):	■ *Project 25 Packet Data Specification*, BAEB-A (Mar 2005) (Overview of Packet Switched Services, MDP/MRC "A" Interface Packet Data, Air Interface "U_M" Packet Data, RFG/ES Interface "E_D" Packet Data, SNDCP Field Definitions and PDU Mappings)

Table 9: Subscriber Data Peripheral Interface and Data Network Interface Documents (Continued)

Document Type	Documents
	■ *Project 25 Circuit Data Specification*, 102.BAEC (Jun 2000) (Overview of Circuit Switched Services, MDP/MRC "A" Interface Circuit Switched Data, MRC/RFG Protocol "UM" Circuit Data, Host Interface "E" Circuit Data, Procedures) ■ *Project 25 Radio Control Protocol* (RCP), 102.BAEE-A (Sep 2004) (RPC: Protocol Characteristics, Request, Response, and Report Class Service Data Units, Simple Network Management Protocol (SNMP): Overview, P25 SNMP Node and RMP MIB Definitions)
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	

3.6 Network Management Interface

The following table lists current P25 Network Management Interface description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory (if using an RF Subsystem) P25 Network Management Interface standard.

Table 10: Network Management Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Network Management Interface Overview*, 102.BAFA-A (Jul 1999) (Network Management Hierarchy, Transport Medium for Network Management Info, System Management Functional Areas)
Protocol (Normative):	(No documents planned)
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	

Table 10: Network Management Interface Documents (Continued)

Document Type	Documents
Performance Recommendations:	
Interoperability Test Procedures:	

3.7 Telephone Interconnect Interface

The following table lists current P25 Telephone Interconnect Interface description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting telephone interconnect features) P25 Telephone Interconnect Interface standard.

Table 11: Telephone Interconnect Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Telephone Interconnect Requirements and Definitions* (Voice Services), 102.BADA-1 (Feb 2004) (General Subscriber Equipment and RF Subsystem Operations, Annex A Project 25 Mandatory vs Optional Tables (Normative), Annex B Message Sequence (Informative)
Protocol (Normative):	(No documents planned)
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	

4 Suite of Standards for Project 25 Services

This section discusses the suite of standards documents for the (currently) two services of a P25 system. For each of the services, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 standards.

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Note! When the document box is empty for a category, please be aware that there are no published TIA standards at this time and be cautious of purchasing products without the benefit of published P25 standards.

Project 25 currently has two broad categories of services. The first deals with encryption for security of voice and data as well as security of radio control channels, etc. The second deals with trunking of radio channels to promote spectrum efficiency.

4.1 Encryption Services

Several encryption algorithms are available for use with P25 systems. The oldest algorithm, for which there are P25 standards documents, is Data Encryption Standard (DES). This particular algorithm is no longer endorsed (after May 2005) by the Federal Government for secure communications. The most recently endorsed algorithm is Advanced Encryption Standard (AES) and must be used by all Federal agency communications systems beyond May 2007. The recommendation has been that State and local agencies also transition to AES to ensure interoperability.

The following subsections define the two algorithms and their use, a standard key fill device to manually load encryption keys into P25 radios, and a standard over-the-air-rekeying procedure to automatically rekey P25 radios.

Encryption is an option for P25 systems but when it is desired, the following standards apply.

4.1.1 Advanced Encryption Standard

The following table lists current P25 Advanced Encryption Standard (AES) description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting AES features) P25 Advanced Encryption standard.

Table 12: Encryption – Advanced Encryption Standard Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Security Services Overview*, 102.AAAB-A (Jan 2005) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management)
Protocol (Normative):	■ *Project 25 Block Encryption Protocol*, 102.AAAD (Jul 2002) (Keystream Generator, Voice Operation, Data Operation, Mandatory Algorithm – DES, Triple Data Encryption Algorithm (TDEA), and AES) ■ *Project 25 Link Layer Authentication*, 102.AACE (Dec 2005) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

4.1.2 Data Encryption Standard

The following table lists current P25 Data Encryption Standard (DES) description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting DES features) P25 Data Encryption standard.

Table 13: Encryption – Data Encryption Standard Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Security Services Overview*, 102.AAAB-A (Jan 2005) (Security Threats, Confidentiality, Integrity, Authentication, and Key Management)

Table 13: Encryption – Data Encryption Standard Documents (Continued)

Document Type	Documents
Protocol (Normative):	■ *Project 25 DES Encryption Protocol*, 102.AAAA-A (Feb 2001) (Description, Encryption Algorithm, General, Voice, and Data Operations) ■ *Project 25 Link Layer Authentication*, 102.AACE (Dec 2005) (Challenge and Response Authentication, Procedures and Operational Descriptions, Control Channel Messages, Key Management and Provisioning, Authentication Mechanism and AES Crypto Details)
	Compliance Assessment Documents
Conformance Tests Procedures:	■ *Conformance Test for Project 25 DES Encryption Protocol*, 102.AAAC (Feb 2001) (Test Parameters, Transmitter Tests, and Receiver Tests)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

4.1.3 Key Fill

The following table lists current P25 Key Fill description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting Key Fill features) P25 Key Fill standard.

Table 14: Encryption – Key Fill Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	■ *Project 25 Key Fill Device (KFD) Interface Protocol*, 102.AACD (Feb 2005) (Manual Rekeying Overview, Interface Protocol Definition)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	(No documents planned)

Table 14: Encryption – Key Fill Documents (Continued)

Document Type	Documents
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

4.1.4 Over-the-Air Rekeying

The following table lists current P25 Over-the-Air Rekeying (OTAR) description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting OTAR features) P25 OTAR standard.

Table 15: Encryption – Over-the-Air Rekeying Documents

Document Type	Documents
Overview (Informative):	**Description and Specification Documents**
	■ *Project 25 Over-the-Air Rekeying (OTAR) Protocol*, 102.AACA, -1, -2 (Apr 2001, Nov 2002, Mar 2003) (Overview of Key Management Techniques, Overview of Protocol – Mandatory and Optional Key Management Procedures, Definition and Use of Response Kinds)
Protocol (Normative):	■ *Project 25 Over-the-Air Rekeying (OTAR) Operational Description*, 102.AACB (Nov 2002) (Key Management Overview, OTAR Concepts, Key Management Definitions and Using OTAR)
Conformance Tests Procedures:	**Compliance Assessment Documents**
	■ *Project 25 Over-the-Air Rekeying (OTAR) Conformance Test*, 102.AACC (Jul 2002) 102.AACC-A (Ballot and publish, expected 2006)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	■ *Project 25 Interoperability Test Procedures – Over-the-Air Rekeying (OTAR)*, 102.CABB (Aug 2003)

4.2 Trunked Services

P25 allows an option to use trunking to increase radio system efficiencies. One trunking scheme uses the radio channels in a frequency division multiple access (FDMA) mode. A second scheme uses the FDMA

traffic channels in a time division multiple access (TDMA) mode to further increase the spectrum efficiencies. The two schemes are defined below.

4.2.1 FDMA Trunked Digital

The following table lists current FDMA Trunked Digital description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting FDMA Trunked Digital features) P25 FDMA Trunked Digital standard.

Table 16: FDMA Trunked Digital Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	■ *Project 25 Trunking Overview*, 102.AABA-A (Jun 2004) (Trunking Overview, Voice and Data Services) ■ *Project 25 Trunking Procedures*, 102.AABD (Oct 1997) (Control and Traffic Channels, Random Access Procedures, Control Channel Acquisition and Retention, Registration and Authentication, Voice Call, Data Call, Wide Area Call, Supplementary Services, and System Status Procedures)
Protocol (Normative):	■ *Project 25 Trunking Control Channel Formats*, 102.AABB-A (Jan 2005) (Control Channel Designation and Modes, Inbound Control Channel Access, Packet and Information Block Structures) ■ *Project 25 Trunking Control Channel Messages*, 102.AABC-B (Mar 2005) (Trunking Packet Description, Single and Multiple Block Packet Structures, Field Definitions, Voice, Data, Control and Status Services Inbound and Outbound Signaling Packets) ■ *Project 25 Link Control Word Formats and Messages*, 102.AABF-A (Dec 2004) (Part of voice message, conventional and trunked: Link Control Messages, Field Definitions, and Word Usages) Word Usages) ■ *Project 25 Conventional Control Messages*, 102.AABG (Jul 1996) (Trunked system messages that may be applied to conventional systems: Emergency Alarm, Call Alert, Radio Check, Inhibit, and Uninhibit, Status Update and Request, Message, Telephone Interconnect Dialing, Radio Unit Monitor) ■ *Project 25 Conventional Control Messages, Addendum 1 – Indvidual Telephone Calls*, 102.AABG-1 (May 2006) (Control Messages Specifications, Annex A Message Sequence (informative))
	Compliance Assessment Documents
Conformance Tests Procedures:	

Table 16: FDMA Trunked Digital Documents (Continued)

Document Type	Documents
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	■ *Project 25 Interoperability Testing for Voice Operation in Trunked Systems*, 102.CABC (Re-ballot and publication Jun 2006) (trunked systems, voice only) (Interoperability Test Procedures: Regular, Queued or Denied, and Announcement Group Call Tests, Protected Traffic Channel Tests, and informative test procedures that are conditional on other trunking documents modification)

4.2.2 Two-Slot TDMA Trunked Digital

The following table lists current Two-Slot TDMA Trunked Digital description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting Two-Slot TDMA Trunked Digital features) P25 Two-Slot TDMA Trunked Digital standard.

Table 17: Two-Slot TDMA Digital Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	
Protocol (Normative):	
	Compliance Assessment Documents
Conformance Tests Procedures:	
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	

5 Suite of Standards for Project 25 Equipment

This section discusses the suite of standards documents for the (currently) five equipment types of a P25 system. For each of the equipment types, a table is provided to identify the documents that have been approved by TIA for publication. Once in publication, the documents are to be used by manufacturers to design, develop, and offer products to the public safety community that meet the P25 system Standards. Similarly, public safety users can identify the TIA-published documents in their request for proposals (RFPs) of P25 systems to ensure that the products to be purchased are associated with the approved P25 Standards.

One or more TIA-published documents are identified with each category of Overview, Protocol, Conformance Test Procedures, Performance Measurement Methods, Performance Recommendations, and Interoperability Test Procedures. For some categories, a document is not necessary or appropriate and those will be identified with a "No documents planned."

Note! When the document box is empty for a category, please be aware that there are no published TIA standards at this time and be cautious of purchasing products without the benefit of published P25 Standards.

The P25 radio equipment must met certain performance standards that are set by spectrum regulators and by P25 system designers to ensure that the radio equipment will behave in predictable manners and act as good neighbors with nearby systems. The required performance will depend upon the modulation and access method used by the system. Also, the P25 radio equipment is expected to meet standards for audio tones and audio interfaces. The sections below relate to the various configurations.

5.1 Analog FM Transceivers

The following table lists current P25 Analog FM Transceiver description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory P25 Phase I Analog FM Transceiver standard, which provides backward compatibility with non-P25 radio systems.

Table 18: Analog FM Transceiver Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	(No documents planned)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	■ *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*, 603-C (Dec 2004) (Methods of Measurement for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)

Table 18: Analog FM Transceiver Documents (Continued)

Document Type	Documents
Performance Recommendations:	■ *Land Mobile FM or PM Communications Equipment Measurement and Performance Standards*, 603-C (Dec 2004) (Standards for Receivers, Transmitters, Unit Characteristics, and Subaudible Signaling.)
Interoperability Test Procedures:	(No documents planned)

5.2 Digital P25 Phase I Transceivers

The following table lists current P25 Digital Phase I Transceiver description, specification, and assessment documents. These documents provide guidance necessary to meet the mandatory Digital P25 Phase I Transceiver standard.

Table 19: Digital Phase I Transceiver Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	(No documents planned)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	■ *Digital C4FM/CQPSK Transceiver Measurement Methods*, CAAA-C (Dec 2004) (Methods of Measurements for Receivers, Transmitters, Trunking Systems, Unit Characteristics)
Performance Recommendations:	■ *Project 25 Land Mobile Radio Transceiver Recommendations, C4FM/CQPSK Modulation*, CAAB-C (Jul 2004) (Standards for All Equipment: Receiver Section, Transmitter Section, Trunked System Timing Characteristics, Unit Characteristics)
Interoperability Test Procedures:	(No documents planned)

5.3 Digital P25 Phase II Transceivers

The following table lists current Digital Phase II P25 Digital Transceiver description, specification, and assessment documents. These documents provide guidance necessary to meet the optional (mandatory if supporting Digital Phase II P25 Digital Transceiver features) Digital Phase II P25 Digital Transceiver standard.

Table 20: Digital Phase II Transceiver Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	(No documents planned)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	
Performance Recommendations:	
Interoperability Test Procedures:	(No documents planned)

5.4 Mobile Radio Push-to-Talk and Audio Interface

The following table lists current P25 Mobile Radio Push-to-Talk and Audio Interface description, specification, and assessment documents.

Table 21: Mobile Radio Push-to-Talk and Audio Interface Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	■ *Project 25 Mobile Radio Push-to-Talk and Audio Interface – Definitions and Methods of Measurement*, 102.CAAC (Sep 2002) (Physical and Electrical Interfaces, Standard Test Conditions, and Methods of Measurement)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)

Table 21: Mobile Radio Push-to-Talk and Audio Interface Documents (Continued)

Document Type	Documents
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

5.5 Audio Tone Signaling

The following table lists current P25 Audio Tone Signaling description, specification, and assessment documents.

Table 22: Audio Tone Signaling Documents

Document Type	Documents
	Description and Specification Documents
Overview (Informative):	(No documents planned)
Protocol (Normative):	■ *Project 25 Mobile Audio Tone Signaling Definition and Requirements*, 102.CAAD (Ballot and publish, expected 2006)
	Compliance Assessment Documents
Conformance Tests Procedures:	(No documents planned)
Performance Measurement Methods:	(No documents planned)
Performance Recommendations:	(No documents planned)
Interoperability Test Procedures:	(No documents planned)

6 Project 25 Decision Trees

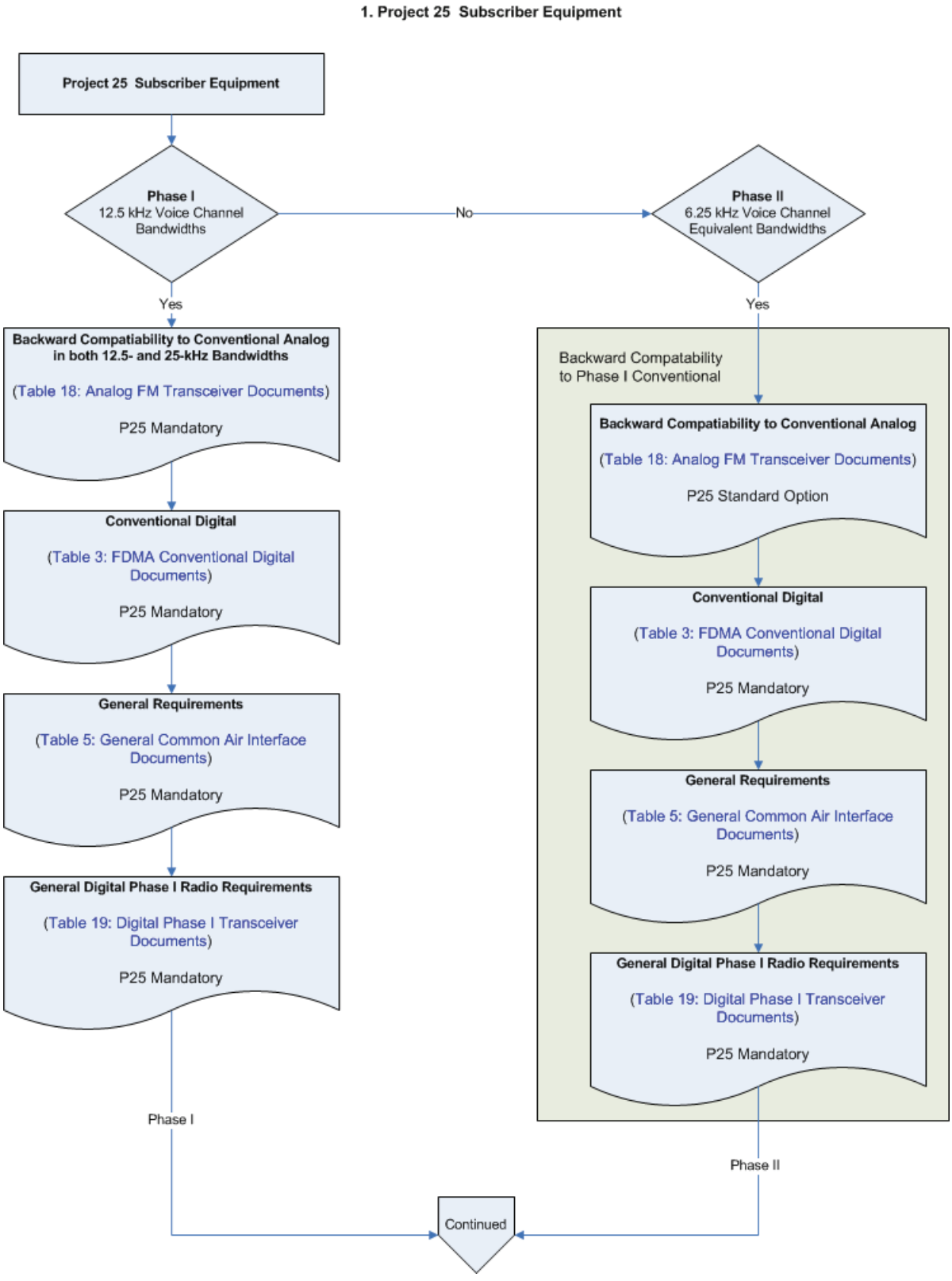
Use the decision trees in this section to find the P25 standards relevant to a given public safety communications component.

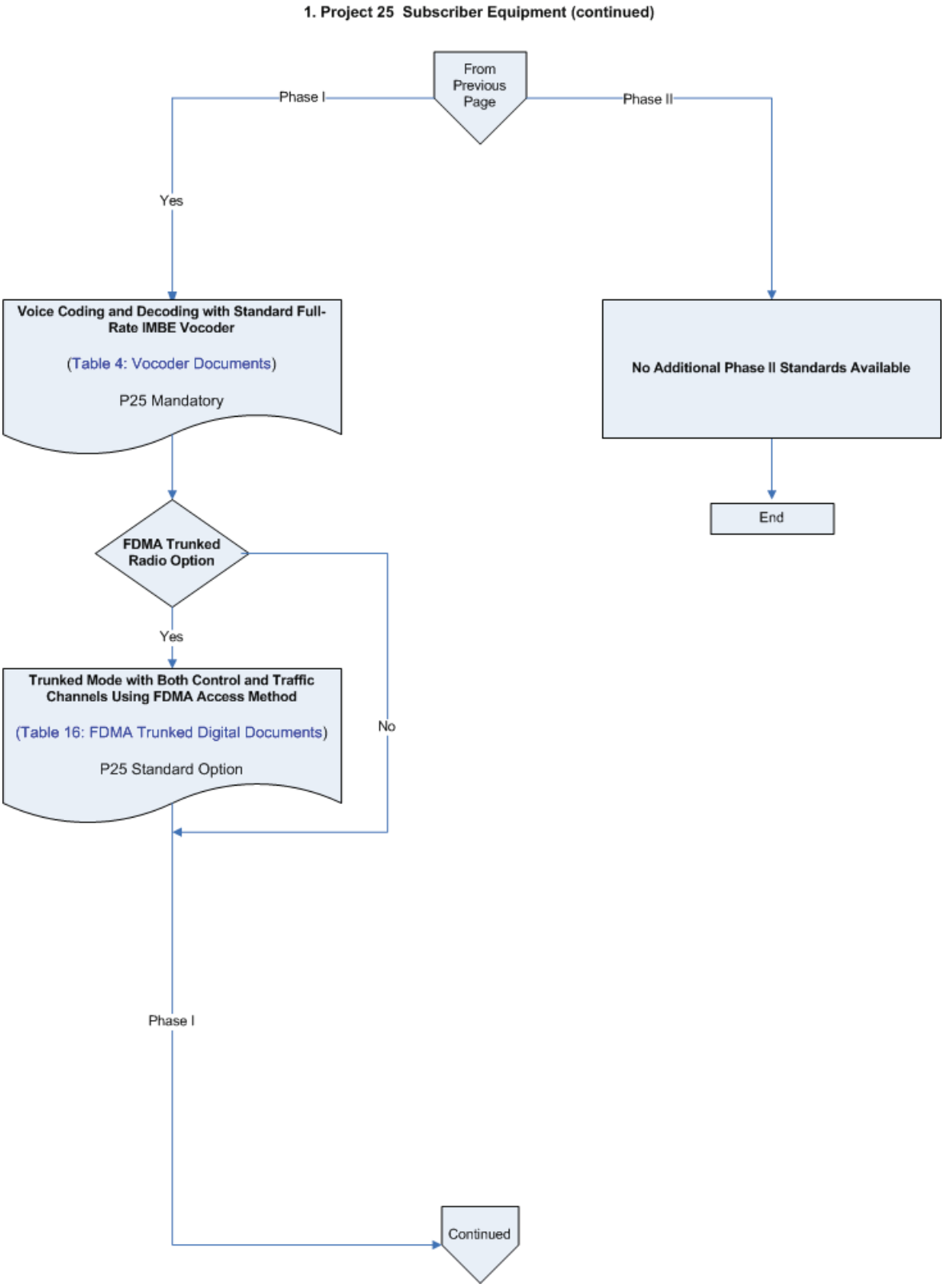
The P25 decision trees span over the next several pages. Graphical arrows denote a break to the next page or a continuation from the previous page.

Note: In the decision trees, click a table's title to jump to that table in this document.

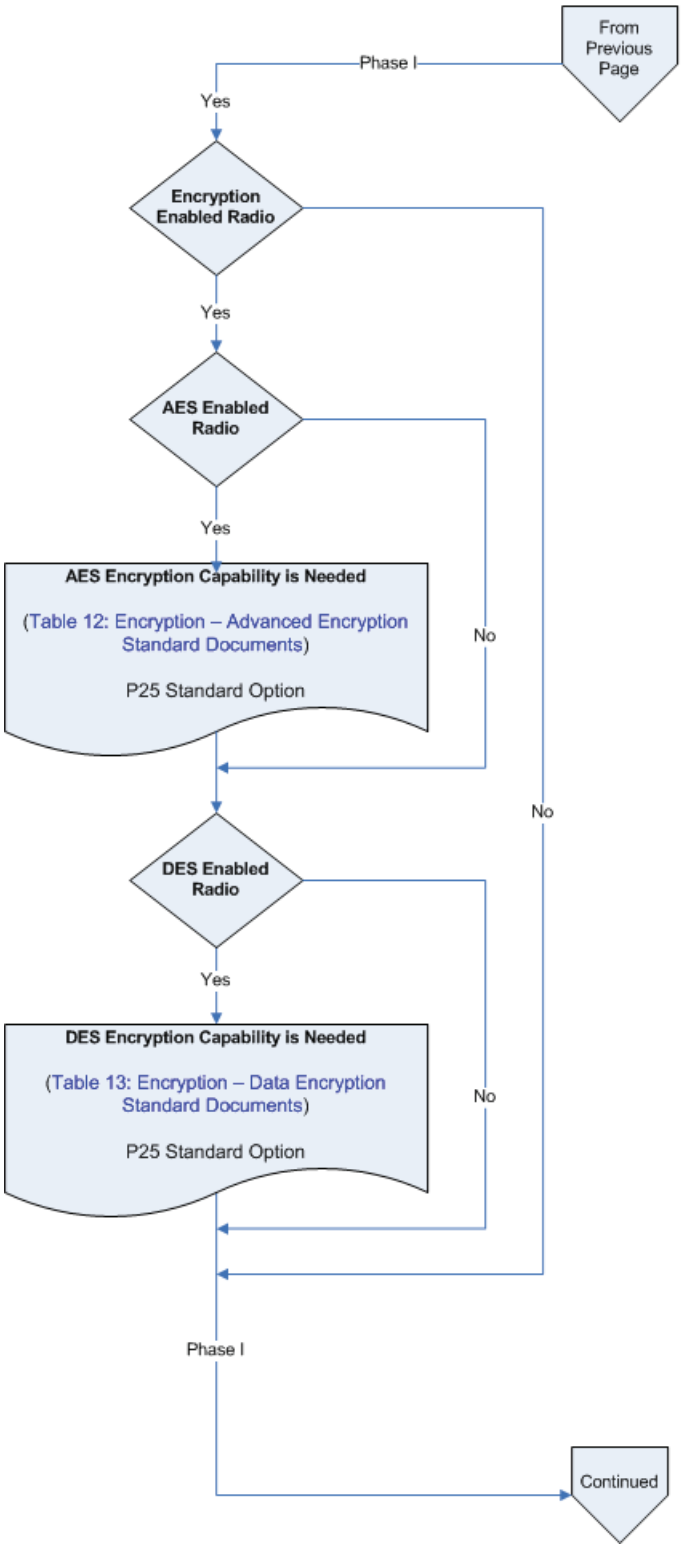
See Section 1.5, "Legend for P25 Standards," on page 2 for information about the identifier convention used for document names.

6.1 Project 25 Subscriber Equipment

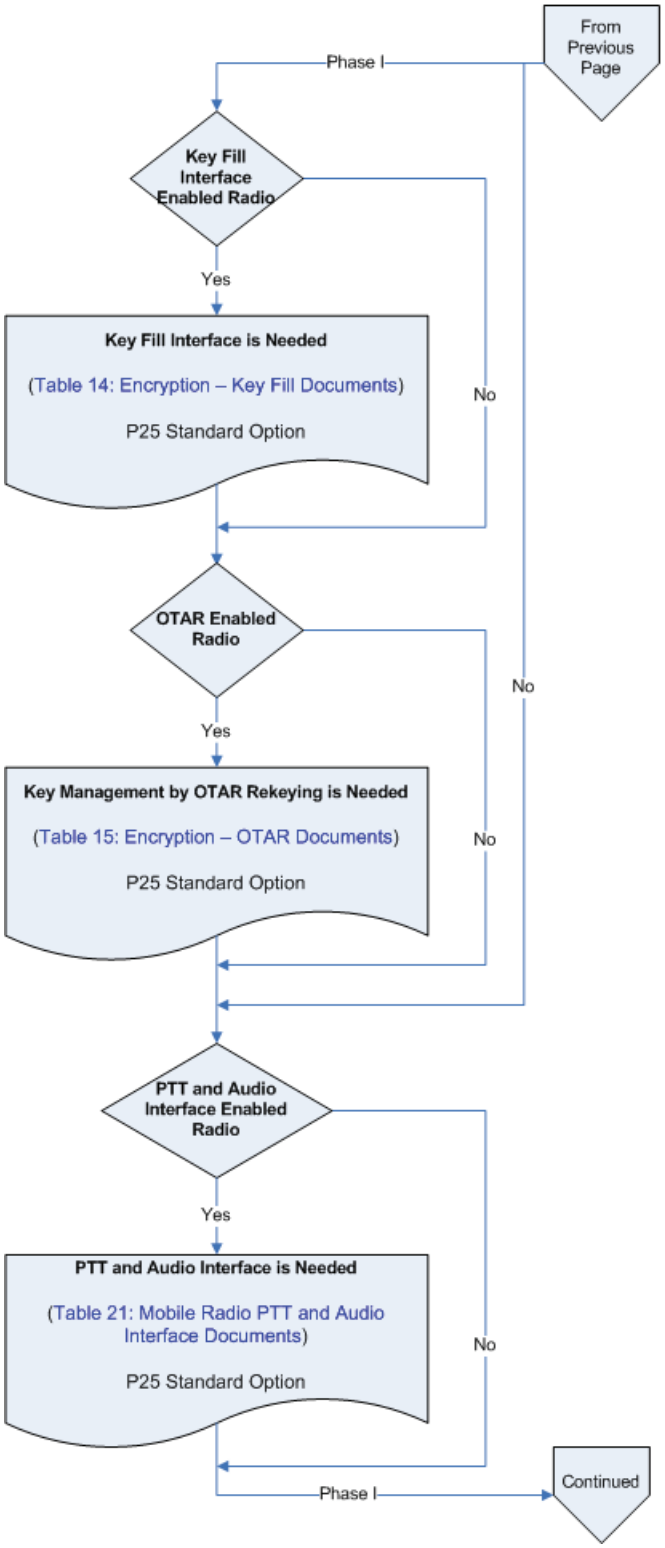



1. Project 25 Subscriber Equipment (continued)
From Previous Page
Phase I
Phase II
Yes
Voice Coding and Decoding with Standard Full-Rate IMBE Vocoder
(Table 4: Vocoder Documents)
P25 Mandatory
No Additional Phase II Standards Available
End
FDMA Trunked Radio Option
Yes
No
Trunked Mode with Both Control and Traffic Channels Using FDMA Access Method
(Table 16: FDMA Trunked Digital Documents)
P25 Standard Option
Phase I
Continued

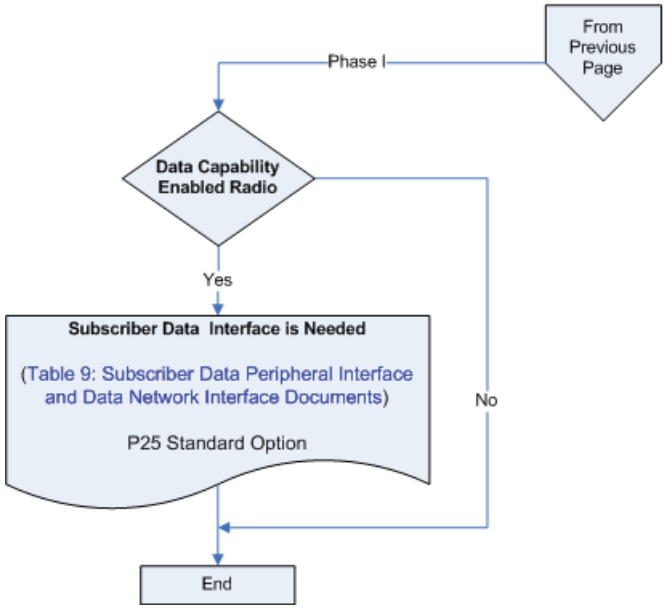
1. Project 25 Subscriber Equipment (continued)



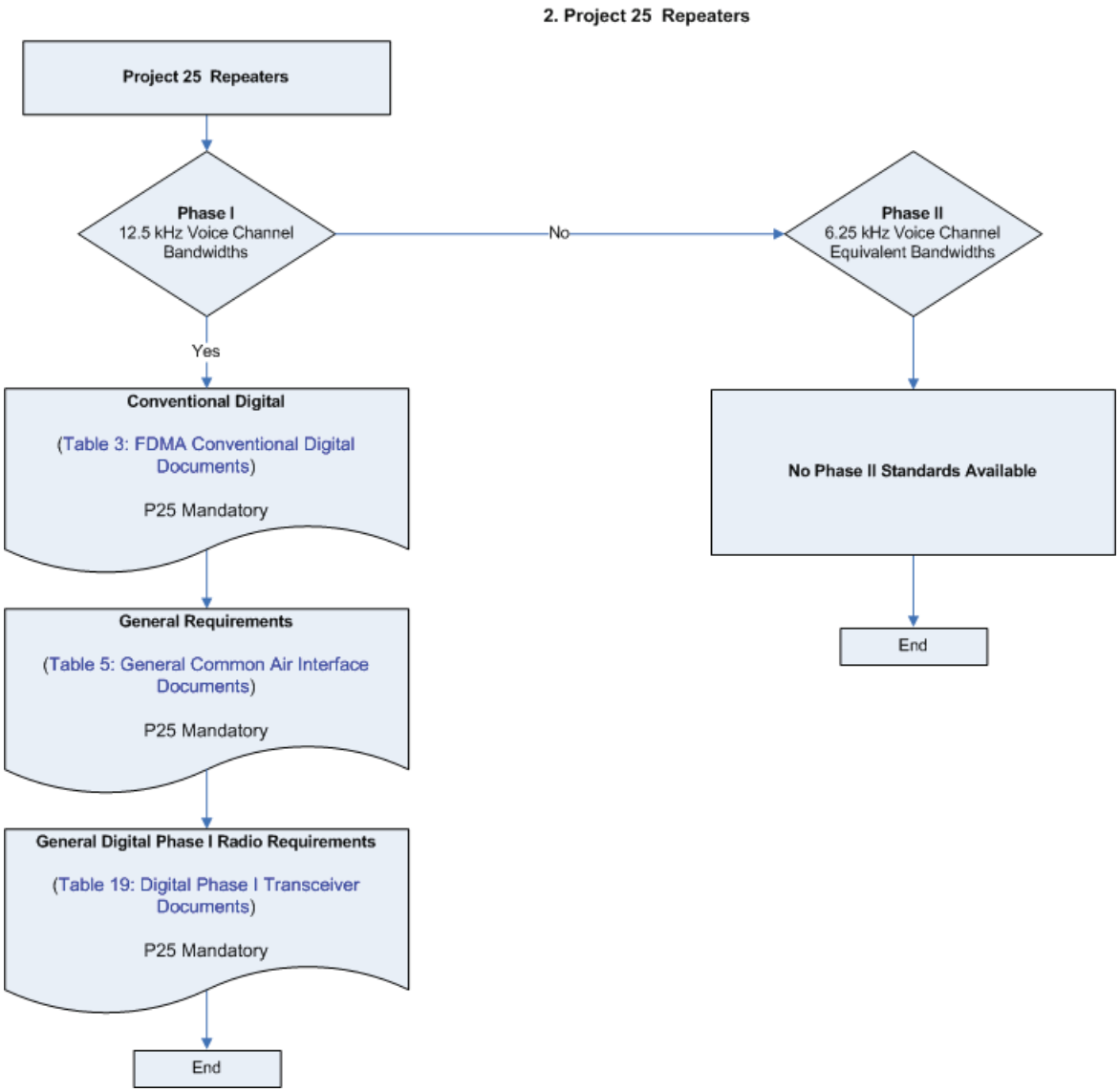
1. Project 25 Subscriber Equipment (continued)



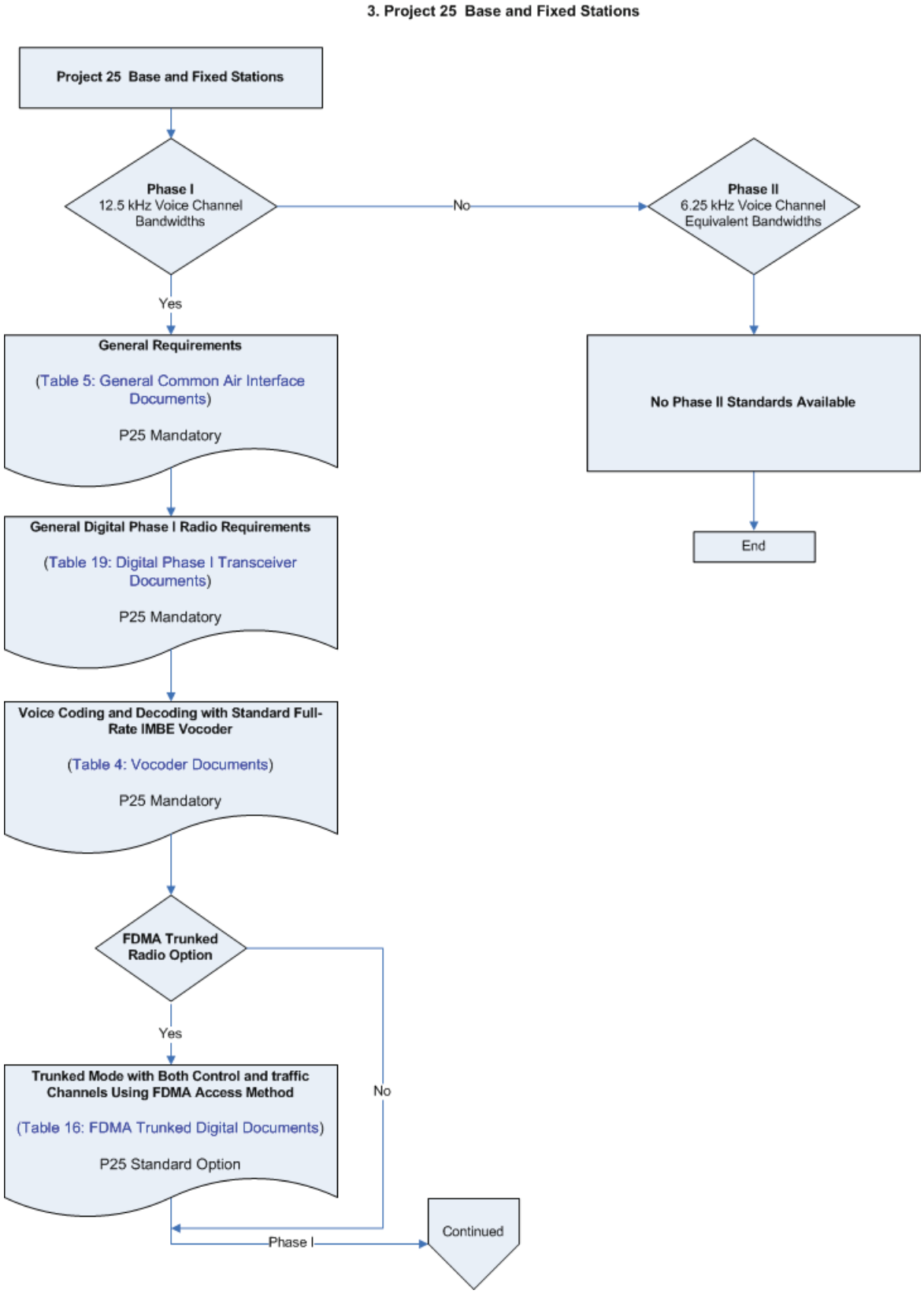
1. Project 25 Subscriber Equipment (continued)



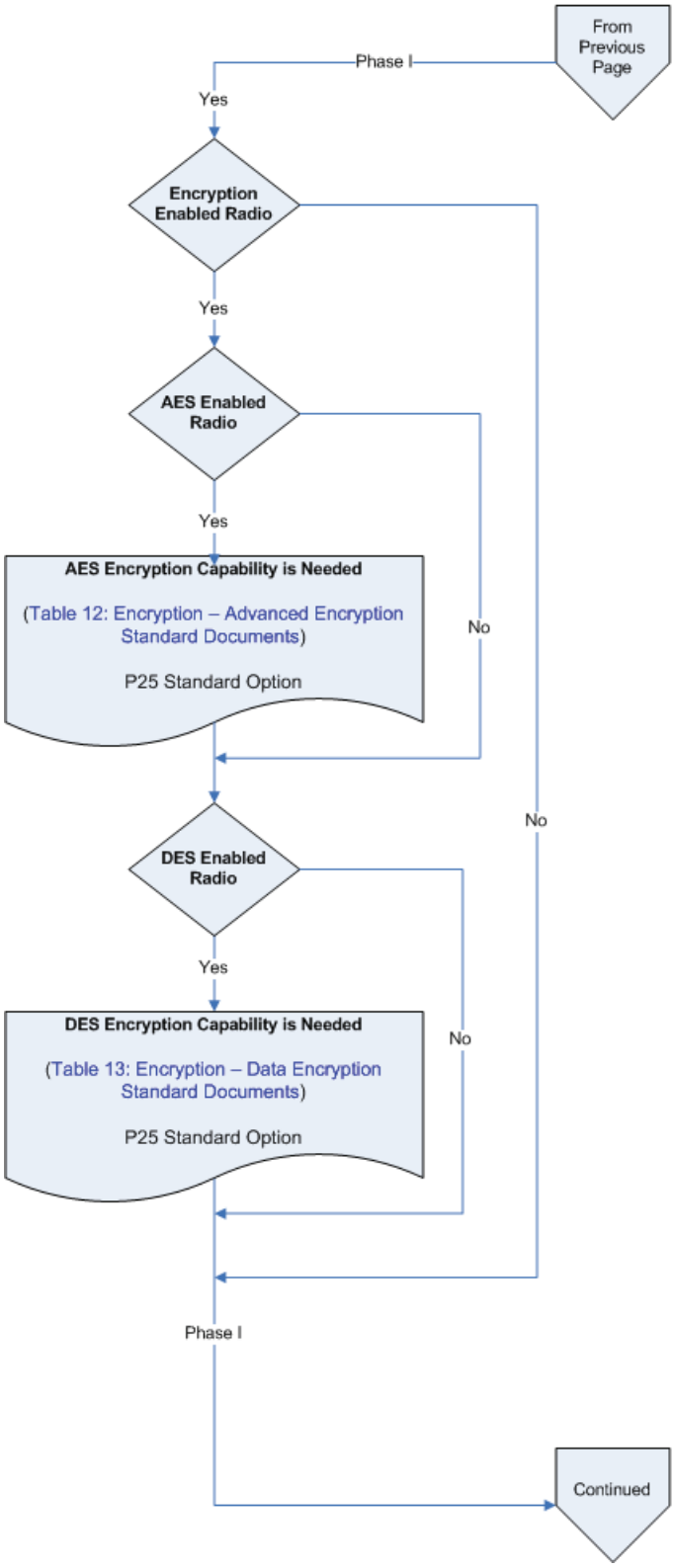
6.2 Project 25 Repeaters

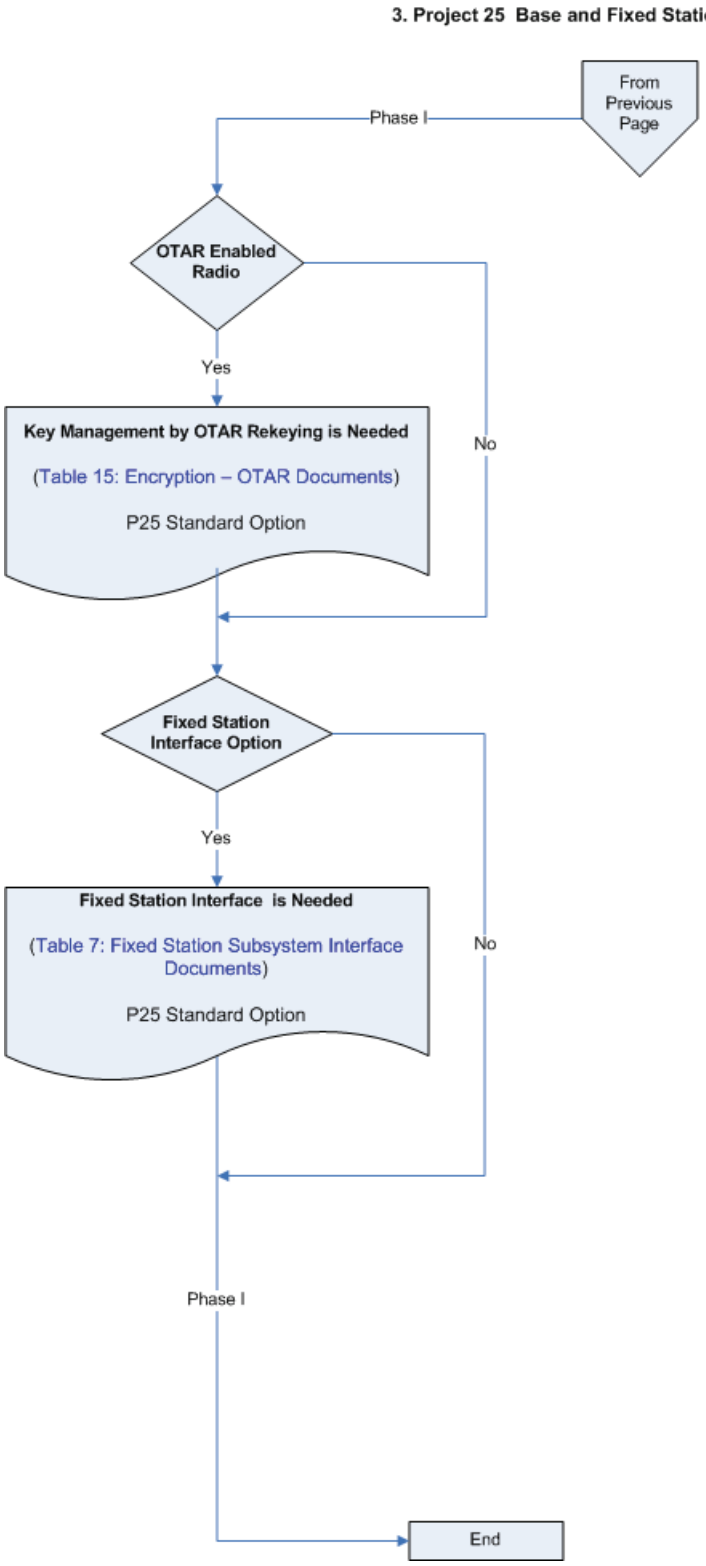


6.3 Project 25 Base and Fixed Stations

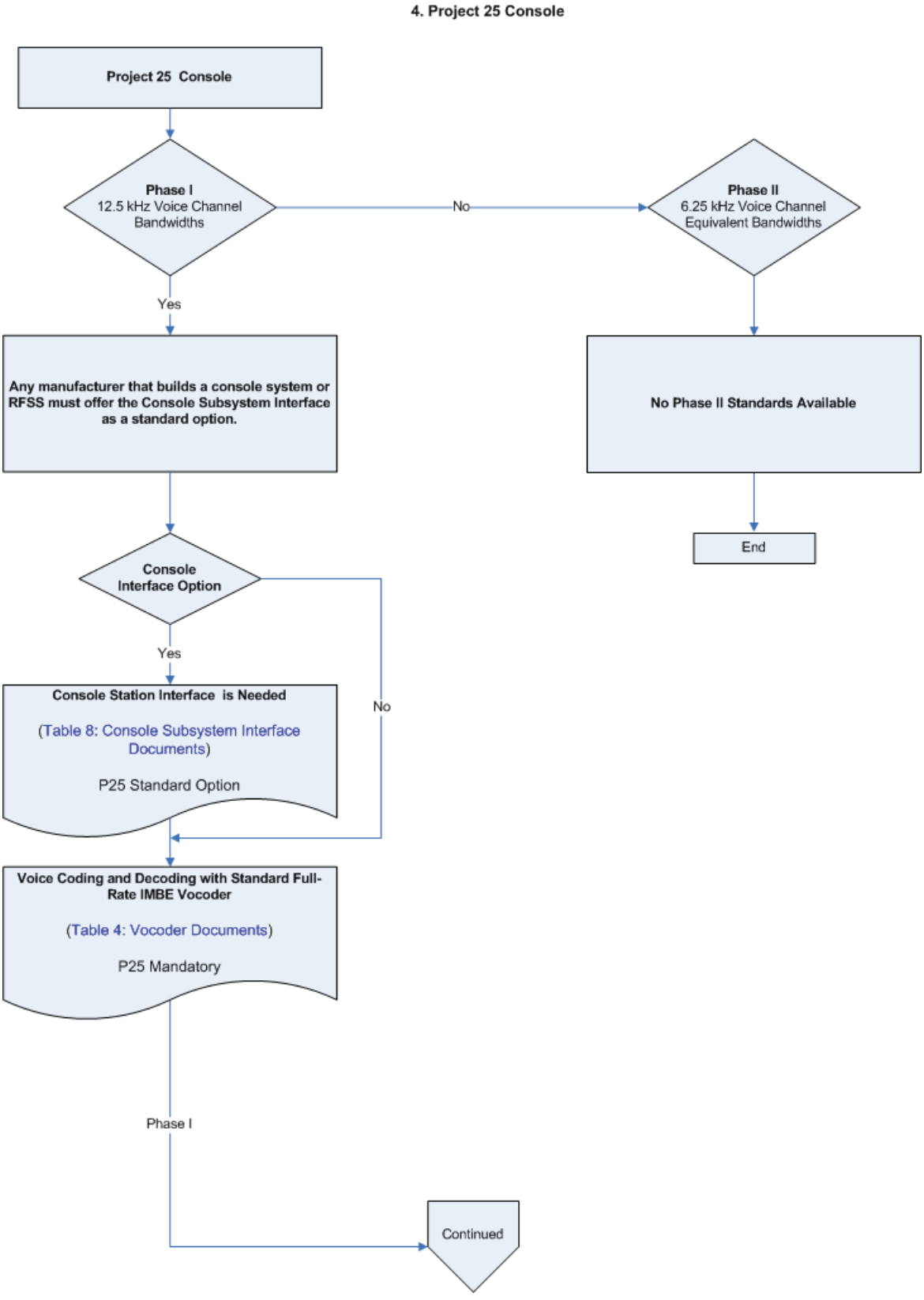


3. Project 25 Base and Fixed Stations (continued)

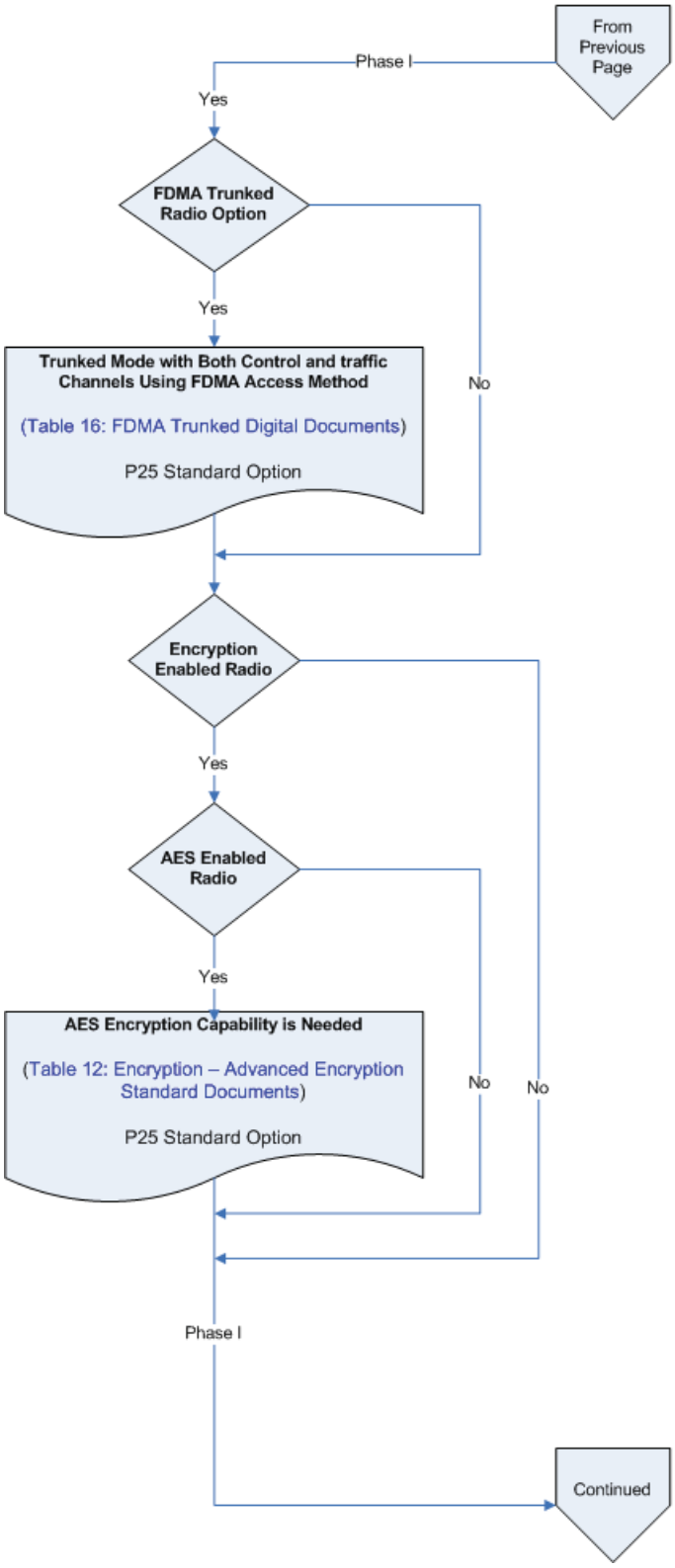



3. Project 25 Base and Fixed Stations (continued)
From Previous Page
Phase I
OTAR Enabled Radio
Yes
No
Key Management by OTAR Rekeying is Needed
(Table 15: Encryption – OTAR Documents)
P25 Standard Option
Fixed Station Interface Option
Yes
No
Fixed Station Interface is Needed
(Table 7: Fixed Station Subsystem Interface Documents)
P25 Standard Option
Phase I
End

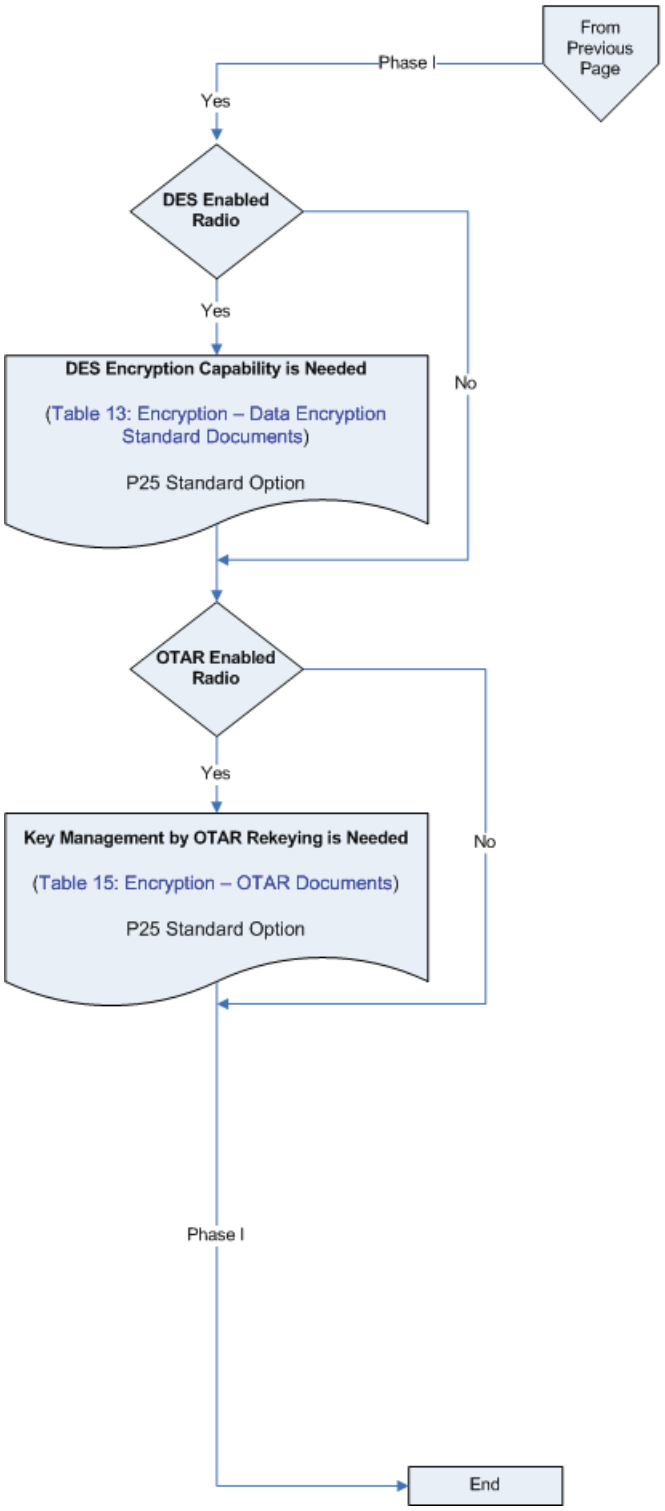
6.4 Project 25 Console



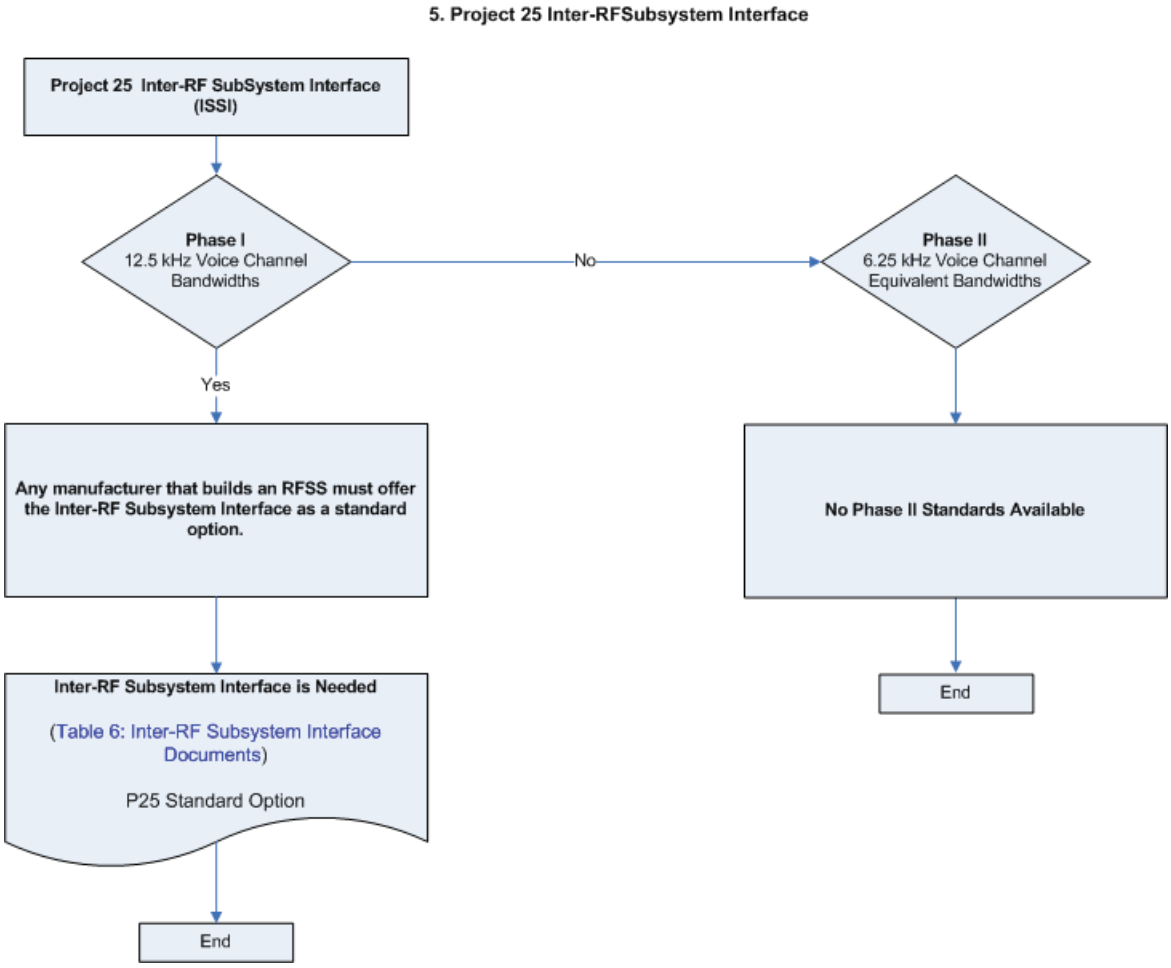
4. Project 25 Console (continued)



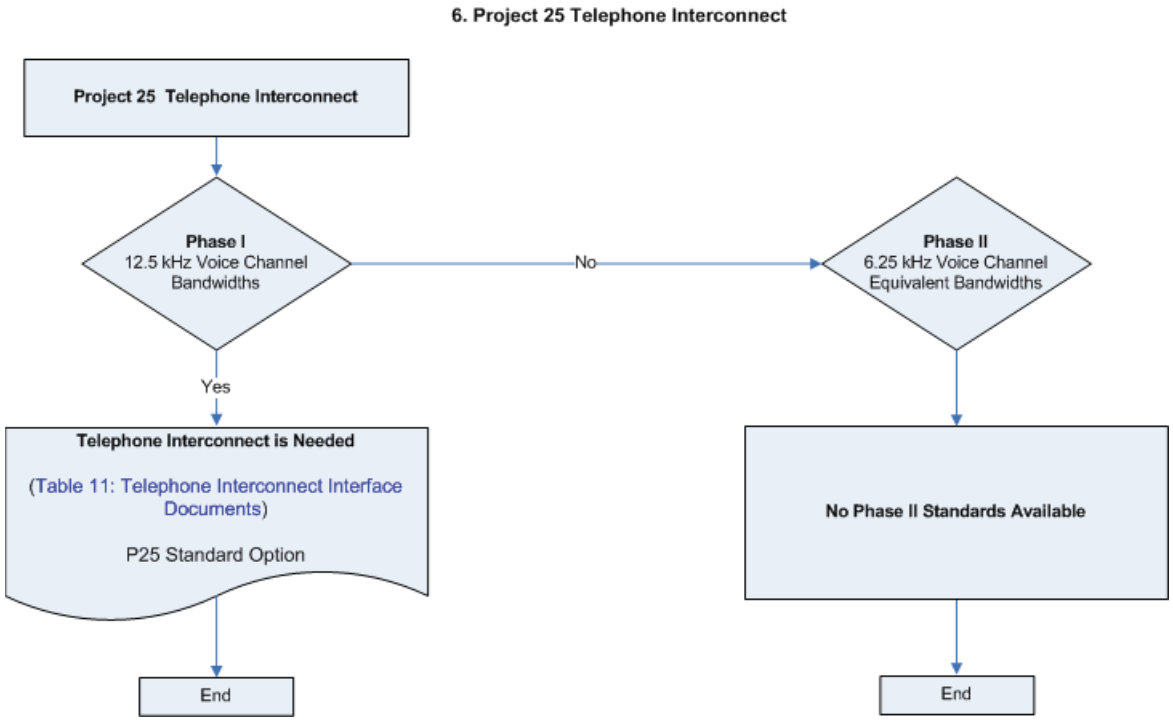
4. Project 25 Console (continued)



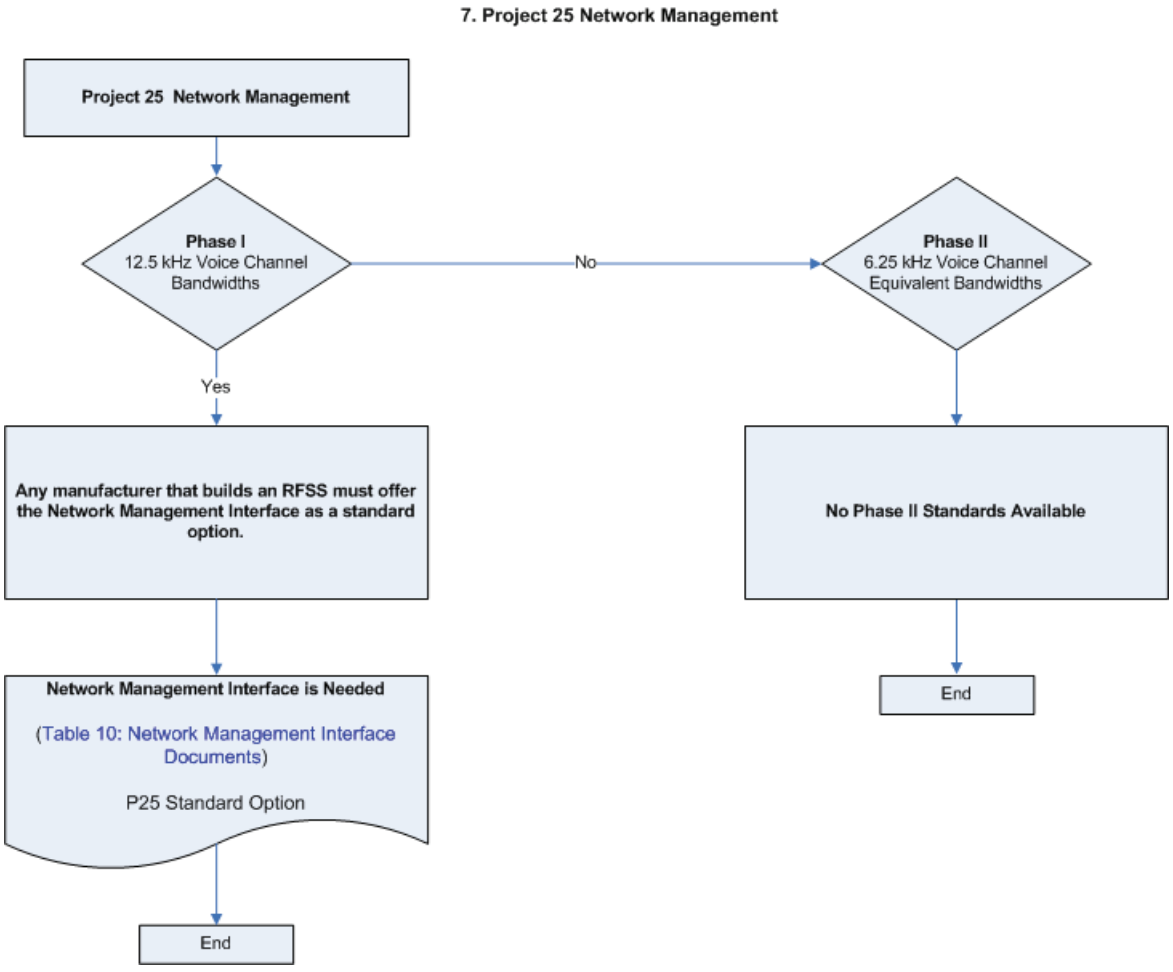
6.5 Project 25 Inter-RF Subsystem Interface



6.6 Project 25 Telephone Interconnect



6.7 Project 25 Network Management



6.8 Project 25 Data Network